【ABSTRACT】

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The present invention relates to a composition for skin external application containing the components of green tea (Camellia sinensis), and more particularly, to a composition for skin external application containing at least one of theanine and catechin, and having properties of decomposing subcutaneous fat, removing cellulites and preventing obesity.

【REPRESENTATIVE FIGURE】

Fig. 1

【KEY WORD】

green tea * theanine * catechin * fat cell * decomposing fats * neutral fat(triglyceride) * free fatty acid * GPDH * obesity * cellulite * cosmetic composition

【SPECIFICATION】

【TITLE】

Composition for external application to the skin containing the active ingredients of green tea.

【BRIEF DESCRIPTION OF DRAWINGS】

Fig. 1 is a graph showing the effect of theanine, a component of green tea, decomposing neutral fat (triglyceride).

Fig. 2 shows the effect of theanine, a component of green tea, on the expression of β_3-adrenergic.

A: Control

B: Treated with 0.005% of caffeine

C: Treated with 0.005% theanine

Fig. 3 is a graph showing the effect of catechin, a component of green tea, prohibiting the differentiation of fat cell.

Fig. 4 is a graph showing the result of an experiment for synergic effects of theanine and catechin inhibiting accumulation of neutral fats in fat cells.

Fig. 5 is a graph showing reduced thigh girth after using the composition for skin external application of the present invention containing theanine and catechin.

Fig. 6 is a graph showing the decreasing rate of subcutaneous fat after using the composition for skin external application of the present invention containing theanine and catechin.

Fig. 7 is a graph showing the slimming effects after using the composition for skin external application of the present invention comprising theanine and

catechin, observed with the naked eye of a researcher.

Fig. 8 is a graph showing the slimming effects after using the composition for skin external application of the present invention comprising theanine and catechin, observed with the naked eye of a user.

【DETAILED DESCRIPTION OF THE INVENTION】

【OBJECT OF THE INVENTION】

【Field Of The Invention And Background Thereof】

The present invention relates to a composition for skin external application containing the components of green tea(Camellia sinensis), and more particularly, to a composition for skin external application containing at least one of theanine and catechin, and having properties of decomposing subcutaneous fat, removing cellulites and preventing obesity.

The present invention is characterized by applying green tea to a composition for external application, instead of green tea as a drink.

A human body has about 20 billion fat cells, which store and release energy in the body. Complex mechanisms exist for storing and releasing energy in a body, and when the amount of energy supplied is more than that consumed, the excess energy is stored as neutral fat (lipid) in the fat cells (adipocytes), and when energy is required the fats are hydrolyzed as free fatty acid and glucose to be used as energy. Obesity appears when the energy balance is broken in this mechanism and excessive energy is accumulated, and as a result, fat cells become larger or the number of fat cells increases.

Women's concerns for body figure are increasing rapidly, due to factors such as an increase of obesity caused by a sedentary lifestyle, a raising of economic independence, and women's desires for improving the quality of life. From a viewpoint of beauty, the desire for cosmetics for slimming and anti-cellulite, which is effective for removing excessive subcutaneous fat and to improve firmness and elasticity of skin, also increases.

Cellulite is generated in the skin and subcutaneous fat, and makes the skin rough like a peel of an orange due to the accumulations of fat and waste materials therein. Even though obesity is not a direct cause of generation of cellulite, cellulite increases when the size or the number of fat cells increases, and therefore decomposing and removing fats in fat cells is very effective in order to maintain preferable body figure and skin state.

The known accelerating materials for decomposing fat are almost all methylxanthines materials such as caffeine, and theophylline, and show the effects for decomposing fat through accelerating adenylate cylase or inhibiting phosphodiesterase, which are enzymes relating to decomposing fat in fat cells. However, the materials are widely recognized as toxic materials, known for having several side effects such as inducing bronchiectasis and aggravating pre-menstrual syndrome, and there are no clear guarantees for their safety. Therefore it is required to find a new material having similar or better effects than those of the materials but without their side effects.

In a prior patent application related to reducing obesity (Japanese patent application No. 2000-53568), it is shown that blood cholesterol and internal organ fat in rats eating theanine were decreased significantly, however research about reducing body fat by theanine has been insufficient. In addition, recently it

is published that catechin, a component of green tea, increases consumption of fats by accelerating an exothermic reaction in brown fat cells of the body (International Journal of Obesity, 2000). However, it is not disclosed how active components of green tea have direct effects on fat cells, and what the mechanisms thereof are.

【Technical Problem To Be Sloved】

The present inventors studied and researched to find safe materials that can improve decomposition or hydrolysis of fats, inhibit differentiation of fat cells and accelerate combustion of fats, and found that active components of green tea, in particular theanine and catechin, have properties of hydrolyzing lipid and decomposing neutral fats in fat cells on application to skin, and as a result, they can decrease the size of fat cells, prevent further creation of fat cells, reduce subcutaneous fat and cellulite, and help to achieve and maintain a preferable elastic and firm body figure.

Therefore, the present invention provides a novel use of theanine that can improve the decomposition of fats; and a novel use of catechin that can suppress the differentiation of fat cells.

The present invention further provides a skin external composition containing theanine or catechin that has properties of decreasing subcutaneous fats, reducing roughness on the skin induced by cellulite, and recovering firmness and elasticity of the skin.

The present invention further provides a method of removing body fat by accelerating the decomposition of neutral fats in cells by applying the components to skin.

The present invention also provides a method of preventing obesity by inhibiting the differentiation and enlargement of fat cells by applying the components to skin.

【COMPOSITION OF TH E INVENTION】

In order to accomplish the object of the invention, the composition of the present invention comprises at least one of theanine and catechin, in which theanine can improve the decomposition of fats and activate metabolism of fat cells consisting subcutaneous fats, and catechin can suppress the differentiation of fat cells and prevent obesity.

In particular, the present invention is characterized by applying green tea to composition for external application, instead of green tea as a drink.

Hereinafter, the present invention is described in detail.

Green tea(*Camellia sinensis*) used in the present invention is an evergreen bush of the camellia family, and is usually processed without fermenting sprouts or leaves in the course of processing. There are reports that in China, green tea has been drunk since around BC2700, and that in Korea, it has been drunk since the period of the King of Sunduk, in Shilla. It is known that green tea contains catechin, flavonoid, theanine, GABA, caffeine, tannin, and several vitamins, and has various effects such as an anti-cancer effect, anti-oxidation effect, anti-bacterial effect, deodorizing effect, reducing blood pressure, enhancing immune functions and others, and recently it is disclosed that green tea has an effect on diet. In particular, catechin is an important functional component of green tea having various medical effects such as an anti-oxidation effect,

anti-cancer effect, anti-bacterial effect and inhibition of heart disease. Various catechins, including (+) catechin (C), (-) epicatechin (EC), (-) epigallocatechin-3-gallate (EGCG), (+) epigallocatechin (EGC), and (-) epicatechin gallate (ECG), are reported up to now. The catechins of the present invention are extracted from green tea and main components thereof comprise EC, EGC, EGCG, ECG, however, the catechin is not limited thereto.

In addition, theanine is a kind of amino acid that exhibits the specific taste of green tea, and has an effect of inhibiting excitation induced by caffeine, and it is reported that when a person takes theanine, α-rays increase, which makes a person relaxed and stabilized (Nippon Nogeikagaku Kaishi. 72(2), 153-157 (1998)). The theanine of the present invention comprises L-form, which is extracted from green tea, and L-theanine, D-theanine and DL-theanine that are synthesized, and any form of the theanines can be used in the present invention.

Methods for extracting effective components of the present invention are not limited, and any methods known in this field can be applied without limitation.

The composition of the present invention comprising at least one of theanine and catechin has excellent effects of decomposing neutral fats in fat cells. More specifically, the composition of the present invention accelerates decomposition of fats by hydrolyzing triglyceride in adipocyte (fat cell) to a free fatty acid and a glycerol. This is because the composition of the present invention improves the expression of β_3-adrenergic receptor in a 3T3-L1 cell differentiated to an adipocyte to enhance and maintain the hydrolysis of triglyceride and has a function to improve the expression of enzymes related to the decomposition and combustion of fats. Therefore, when the composition of

the present invention comprising at least one of theanine and catechin is applied to the skin, the composition can help to make an elastic, firm and smooth body figure by effectively removing body fats.

Further, the composition of at least one of theanine and catechin has properties of suppressing the differentiation of fat cells and preventing accumulation of neutral fats in fat cells. That is, it has properties of preventing enlargement of fat cells and increase of the number of fat cells consisting of subcutaneous fat. This is because the composition of the present invention has an effect on significantly reducing the activation of the enzyme GPDH dehydrogenase that is a marked factor of differentiating fat cells in 3T3-L1 cells differentiated to fat cells. Therefore, when the composition of at least one of theanine and catechin is applied to the skin, the composition can effectively prevent increasing body fats by inhibiting generation and enlargement of fat cells.

In addition to reducing subcutaneous fats, the composition of the present invention can be used for preparing a cosmetic composition for anti-cellulite curing rough skin to be elastic, firm and smooth by applying the composition onto a cellulite site generated due to the enlarged fat cells. In particular, because the components of the composition are extracted from green tea, there are no undesirable side effects or harm to the skin.

In addition to the effects of decomposing and removing fats excessively accumulated in a mature fat cell, the composition of the present invention prevents the differentiation to fat cells to reduce and prevent obesity. Contrary to the conventional methods or compositions that are focused on only one feature, for example on differentiation of fat cells or on acceleration of decomposition of

fats, the composition of the present invention can decompose fats in fat cells already generated and can inhibit generation of fat cells, which provides a novel and direct method and composition for preventing obesity.

Any conventional method can be applied to mix the components of the present invention, theanine and catechin, and one skilled in the art may modify the methods easily. In addition, additives, for example, to make the mixing easier can be adopted without limitation.

In the present invention, the total amount of theanine and catechin of the composition is preferably 0.0001～20wt% to the total weight of the composition, but is not limited thereto.

The external application of the present invention comprises at least one of theanine and catechin, therefore, it can reduce subcutaneous fat to make the body figure slim and has the effects of slimming the body, removing cellulite and firming the body figure by the decomposition of subcutaneous fat when applied onto the skin.

The formulations for the external application of the present composition comprising the effective components of green tea are not limited on the condition that the composition is used for decomposition of fats, and elasticity and firmness of skin. For example, the formulation may comprise skin softener, nutrition water, nutrition lotion, massage cream, nutrition cream, pack, gel, and skin adhesive type formulations, in addition to lotion, ointment, gel, cream, patch, spray and the like.

In the above formulations, in addition to theanine and catechin of the effective components of the present invention, any other conventional component may be selected and added by one skilled in the art. By the addition of proper

components, synergic effect can be accomplished.

Hereinafter, the present invention is described in more detail with Examples and Experimental Examples, however the scope of the invention is not limited thereto.

[Preparation Example 1] Extraction of catechin

2kg of green tea leaves were soaked in 10ℓ of water at 80℃ for 5 hours to obtain extract and the solution was removed, then the residue was further soaked in 5ℓ of water at 80℃ for 3 hours and the solution again removed and added to the initial solution. The solution was filtered with filtration paper and treated with ethyl acetate to obtain ethyl acetate fraction, and treated with chloroform to remove caffeine then concentrated. The resultant solution was passed through a Sepharose column and extracted with a mixture of methylene chloride and methanol (1:1), then the extracted solution was concentrated at 40℃ to obtain catechin powder.

[Reference Example] Isolation of fat cell (adipocyte)

3T3-L1 cells of fibroblast cell line of rat were adhered to a 6-well culture plate with $1X10^5$cells/well and filled with DMEM (Dulbecos codified eagles medium, GIBCO BRL, Life Technologies CO., LTD.) containing 10% of fetal bovine serim(FBS). After 2 days, new DMEM (containing 10% FBS) was exchanged for the existing DMEM and the cells were cultured for a futher 2 days. Then, the cultured cells were induced for differentiation with DMEM (containing 10% FBS) containing 1㎍/ml of insulin, 0.5mM of IBMX and 0.25 μM of

dexamethasone, and after 2 days further DMEM containing insulin was exchanged for the existing DMEM, and the cells were cultured for a further 5 days. After 5 days, normal culture medium (DMEM containing 10% FBS) was exchanged for the exisiting DMEM, and the cells were cultured until the fat cells were morphologically changed.

<Experimental Example 1> Effect of theanine accelerating decomposition of neutral fats

In order to measure the effect of the theanine decomposing neutral fats of fat cells, 3T3-L1 fat cells differentiated in the Reference Example were used.

3T3-L1 fat cells were washed with PBS (phosphate buffered saline) twice, and DMEM containing 0.5% of bovine serum albumin (BSA) free from fatty acid was added thereto. Theanine (more than 97%) was obtained from KuridaKogyo (Japan), and measurement of the quantity of the glycerol was performed with the chromphoric reaction method using a GPO-trinder kit from Sigma (St. Louis, MO, U.S.A.), and absorption was measured at 540nm using an ELISA reader. A control was cultured without experimental or comparative material and the result of each component was calculated based on the data of the control set as 100%. In addition, a sample treated with the same concentration of caffeine as that of theanine was used as a positive comparative, and the degree of decomposition of fat was observed by measuring the concentration of glycerol isolated into the culture medium from fat cell. The results are shown in Fig. 1.

As can be seen in Fig. 1, compared with the control, the concentration of glycerol isolated into the culture medium from fat cells increased in the sample treated with theanine extracted from green tea. In addition, theanine does not

cause cell toxicity at high concentration and showed a greater effect of decomposition of fat than that of caffeine, a positive comparative control, known to have the effect of decomposing fat.

<Experimental Example 2> Effect of theanine controlling expression of the β_3-adrenergic receptor

In order to clarify the mechanism of acceleration of decomposition of neutral fat by the theanine, 3T3-L1 fat cells differentiated in the Reference Example were used. The cells were treated with 0.005% of theanine (more than 97%) obtained from KuridaKogyo (Japan) and comparative materials (caffeine, control), and 24 hours later, RNAs were extracted from the cells and RT-PCR performed. The results are shown in Fig. 2.

The RT-PCR kit was obtained from TaKaRa, and primer of β_3-adrenergic receptor was obtained from Bioneer.

As can be seen in Fig. 2, the expression of β_3-adrenergic receptor, a signal of decomposition of fat in a fat cell, increased by the treatment of theanine, and therefore it was verified that the effect of theanine decomposing fat is due to the increase of the expression of the receptor.

<Experimental Example 3> Effect of catechin inhibiting differentiation of fat cell

In order to measure the effect of catechin accelerating the composition of neutral fat in a fat cell, an experiment of culturing and measuring absorption using fibroblast cell line was performed.

3T3-L1 fat cells differentiated in the Reference Example were washed with PBS (phosphate buffered saline) three times, and harvested with extraction

buffer (20mM of Tris, 1mM of EDTA and 1mM of 2-mercaptoethanol). The harvested cells passed G26 needle 6 times on an ice base, then were centrifuged at 15000 Xg, 4℃ for 3 minutes and the supernatant was gathered to obtain cell extracts.

In order to measure the expression of GPDH (glycerol-3-phosphate dehydrogenase), GPDH assay buffer containing 0.1M of triethanolamine, 2.5mM of EDTA, 0.1mM of 2-mercaptoethanol, 125uM of NADH (nicotinamide adenine dinucleotide, reduced form) and 100uM of DHAP (dehydroxyacetonephosphate) was added to the above-obtained cell extracts, then the decrease of absorption was measured at 340nm for 2 minutes. The amount of change was described with a unit of dA/min per mg. A Control was cultured without experimental or comparative material and the result of each component was calculated based on the data of the control being set as 100%. The results are shown in Fig. 3.

As shown in Fig. 3, when catechin was added to 3T3-L1 cells during cell differentiation, differentiation was significantly inhibited compared with that of the control.

<Experimental Example 4> Effects of theanine and catechin inhibiting neutral fat

In order to measure the effects of theanine and catechin affecting the generation of neutral fat, an experiment of culturing and measuring absorption using fibroblast cell line was performed.

Neutral fats in the cell extracts obtained in the same manner as those in Experimental Example 3 underwent chromphoric reaction using GPO-trinder kit from Sigma (St. Louis, MO, U.S.A.), and absorption was measured at 540nm using an ELISA reader. The results are shown in Fig. 4.

As can be seen in Fig. 4, compared with the control, when 3T3-L1 cells were treated with theanine and catechin during cell differentiation, the amount of neutral fat decreased, and when the above two components were used together the decrease of accumulated neutral fat was more significant.

<Experimental Example 5> Measurement of skin irritation of the effective components of green tea

Skin irritations caused by the effective components of green tea were measured observing edema and erythema on the skin of a New Zealand white rabbit.

A vehicle, and solutions of 10% theanine, of 10% catechin, and of 10% mixed theanine and catechin were applied on the skin of a New Zealand white rabbit, twice a day for 4 days, total 8 times. After application, a total skin irritation index was calculated by summing up the scores of erythema and edema. The index of skin irritation was measured according to Table 1, and the results are shown in Table 2. The skin irritation index was calculated according to Draize's skin Primary Irritation Index (P.I.I.) (Draize, J.H., Appraisal of the safety of chemical in foods, drugs and cosmetics).

[Table 1]

Degree of skin irritation		score
Erythema and Crab	No erythema	0
	Very weak erythema (slightly observable by the naked eye)	1
	Clear erythema	2
	Severe erythema	3
	Dark red strong erythema and generation of crab	4
Edema	No edema	0
	Very weak edema (slightly observable by the naked eye)	1

	Clear edema (distinguishable)	2
	Severe edema (swollen about 1㎜)	3
	Strong edema (swollen more than 1㎜ and extended outwards)	4
(Note) Primary Irritation Index =(mean sum of score of erythema and score of edema)/4		

[Table 2]

Component	Primary Irritation Index (0~4)
Vehicle	0.7
10% Solution of theanine	0.7
10% Solution of catechin	0.8
10% Solution of theanine and catechin	0.8

As can be seen in Table 2, the effective components do not cause skin irritation compared with the control.

[Example 1 and Comparative Example 1]

Slimming/anti-cellulite lotions were prepared according to the following Table 3, which shows Example 1 and Comparative Example 1.

[Table 3]

Component	Example (wt%)	Comparative Example (wt%)
	1	1
Distilled water	To 100	To 100
Theanine	1.00	-
Catechin	1.00	-
Vegetable hydrogenated oil	1.50	1.50
Stearic acid	0.60	0.60
polyglycerol-10 pentastearic & behenyl alcohol & sodium stearoyl lactylate	1.00	1.00
Arachidyl behenyl acohol & arachidyl glucoside	1.00	1.00
Cetylaryl alcohol & cetylaryl glucoside	2.00	2.00

PEG-100 stearate & glycerol oleate & propyleneglycol	1.50	1.50
caprylic/capric triglyceride	4.00	4.00
Meadowfoam seed oil	3.00	3.00
Cetyl octanoate	4.00	4.00
cyclomethycon	6.00	6.00
Methyl paraben	0.20	0.20
Propyl paraben	0.10	0.10
Sodium EDTA	0.02	0.02
Triethanol amine	0.13	0.13
Glycerine	8.00	8.00

<Experimental Example 6> Slimming effect of the effective components of green tea

50 adult females of 25~35 years old having topical obesity or cellulite and whose BMI [Body Mass Index, (weight(kg)/height(m))^2] ranged from 21 to 27 were selected. The lotion compositions prepared in Example 1 and Comparative Example 1 were applied to them for 8 weeks twice a day on the inner part of thighs with massaging. The estimations by using a machine, a researcher (dermatologist) and questions were experimented before using the lotion and after 8 weeks of using the lotion to verify the effects.

[Thigh girth]

The thigh girth was measured by a measuring tape after marking at two specific regions of both thighs, that is the upper part and middle part of the thigh. Obtained data was treated by a method of Student t test or Wilcoxon test as a positive verification, and the results before and after using the compositions were compared analyzing statistic significance (significance level α=0.05). To confirm homogeneity of dispersion and distribution, each data was treated by a Student t

test method if results were homogeneous after doing a Levene test and Kolmogorov-Smirnov test. The results are shown in Fig. 5.

[Thickness of cellulite]

Measurement of the thickness of the subcutaneous fat and permeated cellulite was performed using Ultrasound-EuB 415 US scanner with ultrasonic waves (unit: mm), data was treated by a method of Student t test or Wilcoxon test as a positive verification, and the results before and after using the compositions were compared analyzing statistic significance (significance level α=0.05). To confirm homogenesity of dispersion and distribution, each of data was treated by a Student t test method if results were homogeneous after doing a Levene test and Kolmogorov-Smirnov test. The results are shown in Figs. 7 and 8.

[Rating with the naked eyes]

Degree of skin firmness and cellulite was observed with the naked eyes of a researcher. Obtained data was treated by a method of Wilcoxon test as a positive verification, and the results before and after using the compositions were compared analyzing statistic significance (significance level α=0.05). The skin firmness out of the rated indexes were scored by the examiner from 1 to 9, and cellulite was scored was scored from 0 to 4 with the naked eyes. The results are shown in Fig. 7.

[Rating by users]

Rating by users was carried out by methods of self-rating and question rating. The self-rating index was scored from 1 to 9, and the index was based on

the degree of cellulite. The results are shown in Table 4 and Fig. 8.

[Rating of skin safety]

Skin safety of the composition was evaluated by observing irritation and side effects on the skin, as evaluated by a dermatologist for the experiment period. The evaluation was carried out by the method of Experimental Example 5, and the evaluation standard was that shown in Table 1. The results are shown in Table 5.

【Table 4】

Items	Respondence
Freshness	96
Smoother skin	85
Comfort	80
Soft skin	72
Beautiful skin	69

【Table 5】

	Skin Primary Irritation Index (0~4)
Vehicle	0.7
10% solution of theanine	0.7
10% solution of catechin	0.8
10% solution of theanine and catechin	0.8

As can be seen in Fig. 5, after 8 weeks using the compositions, reduction of the thigh girth was observed significantly in the group using the lotion composition of Example 1 containing the effective components of green tea through decreasing 1.0cm of the thigh girth, compared with the group using that of Comparative Example 1.

As can be seen in Fig. 6, reduction of the thickness of the subcutaneous fat was observed significantly in the group using the lotion composition of Example 1 by decreasing 3.2% of subcutaneous fats, whereas the thigh of the group using that of Comparative Example 1 showed no significant changes.

As can be seen in Fig. 7, in rating effects by a researcher, reduction of cellulite (-28%) and increase of skin firmness (+18%) was observed significantly in the group using the lotion composition of Example 1, compared with the group using that of Comparative Example 1.

As can be seen in Fig. 8, in rating effects by users, reduction of cellulite (-31%) and increase of skin firmness (+19%) was observed significantly in the regions using the formulation of the present invention.

As can be seen in Table 4, in rating sensation of use by users, almost all responded that they felt freshness (96%) and smoother skin (85%) after 8 weeks using the compositions, and a majority responded that they felt comfort (80%), soft skin (72%) and beautiful skin (69%).

As can be seen in Table 5, the effective components of green tea have little skin irritation on human, compared to the control.

As shown in the above, the composition containing theanine and catechin of green tea has effects on decomposing subcutaneous fat, reducing cellulite of women, and making skin firmer. Furthermore, the composition has an excellent sensation of use.

【EFFECT OF THE INVENTION】

As shown in the above, the composition of the present invention

containing the effective components has excellent effects of decomposing neutral fats in fat cells, and accelerates decomposition of fats by hydrolyzing triglyceride in adipocyte (fat cell) into free fatty acid and glycerol, and can thereby prohibit obesity and reduce subcutaneous fat cellulite to make a firmer and smoother skin and body figure. Further, the composition of the present invention provides a composition for skin external application that can be used in cosmetic compositions for anti-cellulite, and that can develop the cosmetic industry.

【CLAIMS】

1. A composition for skin external application for decomposing fats in fat cells containing at least one selected from the group consisting of theanine and catechin as effective components, that accelerates decomposition of neutral fats in fat cells.

2. The composition according to Claim 1, wherein said theanine and catechin are extracted from green tea.

3. The composition according to Claim 1, wherein said theanine is at least one selected from the group consisting of L-theanine, D-theanine and DL-theanine.

4. The composition according to Claim 1, wherein said catechin is at least one selected from the group consisting of (+) catechin (C), (-) epicatechin (EC), (-) epigallocatechin-3-gallate (EGCG), (+) epigallocatechin (EGC) and (-) epicatechin gallate (ECG).

5. The composition according to Claim 1, wherein the effective components are contained in a total amount of 0.0001 ~20 wt% to the total amount of the composition.

6. The composition according to Claim 1, wherein said theanine improves the expression of β_3-adrenergic receptor of fat cells to accelerate decomposition

of fats.

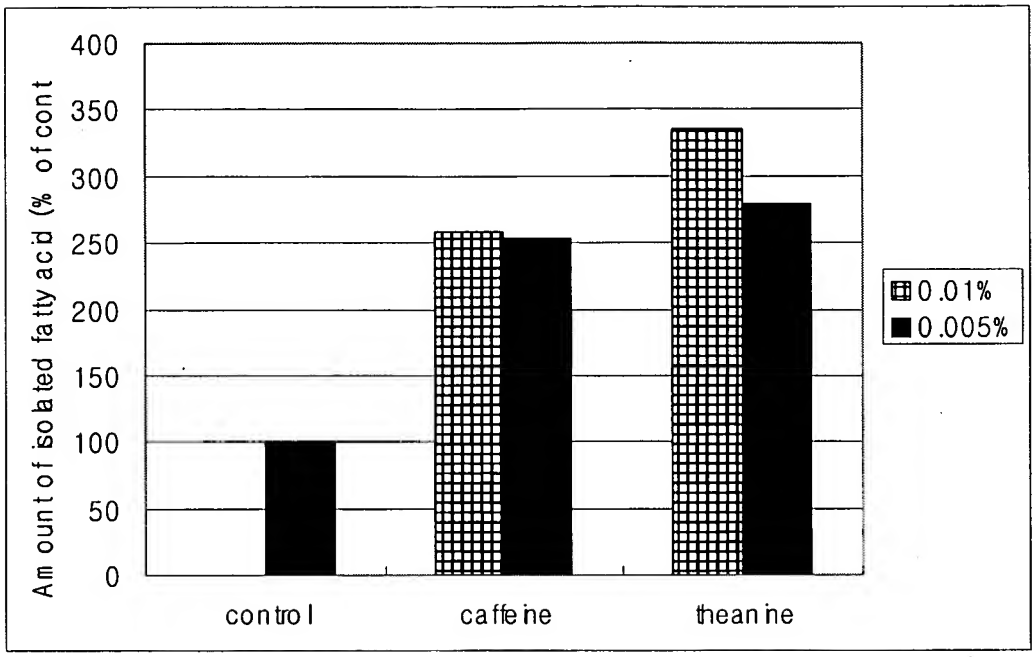
7. A composition for skin external application for inhibiting obesity containing at least one selected from the group consisting of theanine and catechin as effective components, that suppresses differentiation of fat cells.

8. A composition for skin external application for anti-cellulite containing at least one selected from the group consisting of theanine and catechin as effective components, that reduces cellulite.

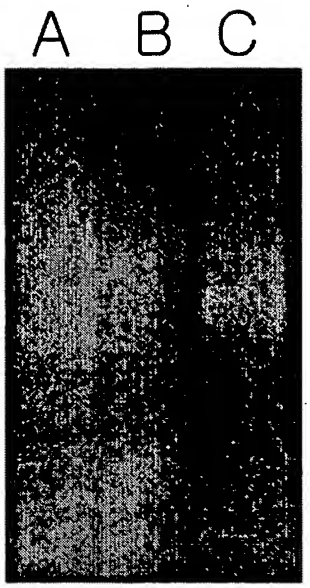
9. A composition for skin external application for slimming containing at least one selected from the group consisting of theanine and catechin as effective components, that reduces topical obesity

【FIGURE】

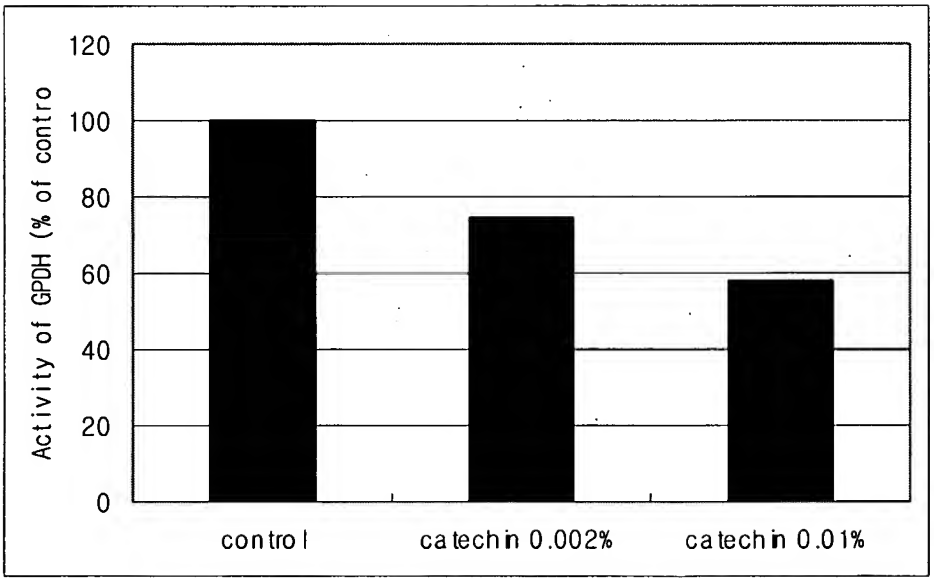
【FIG. 1】



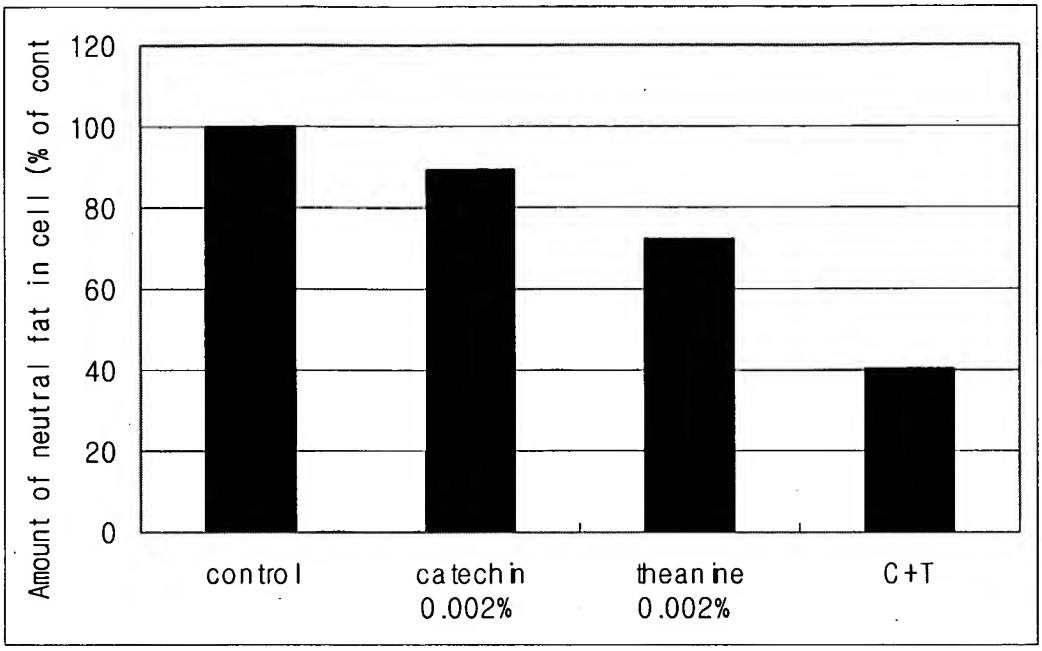
【FIG. 2】


A B C

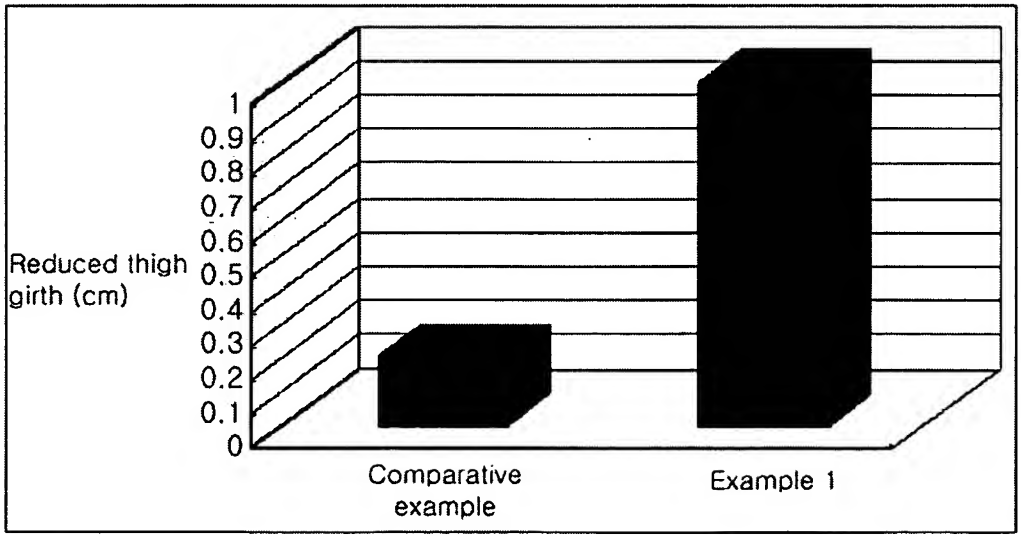
【FIG. 3】


120
100
80
60
40
20
0
Activity of GPDH (% of contro
control
catechin 0.002%
catechin 0.01%

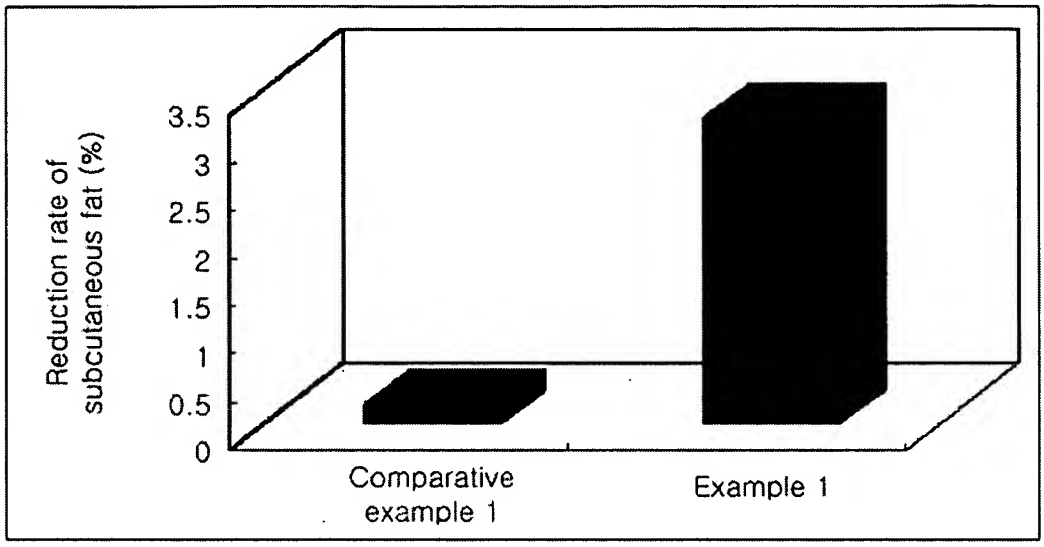
【FIG. 4】


Amount of neutral fat in cell (% of cont
120
100
80
60
40
20
0
control
catechin 0.002%
theanine 0.002%
C+T

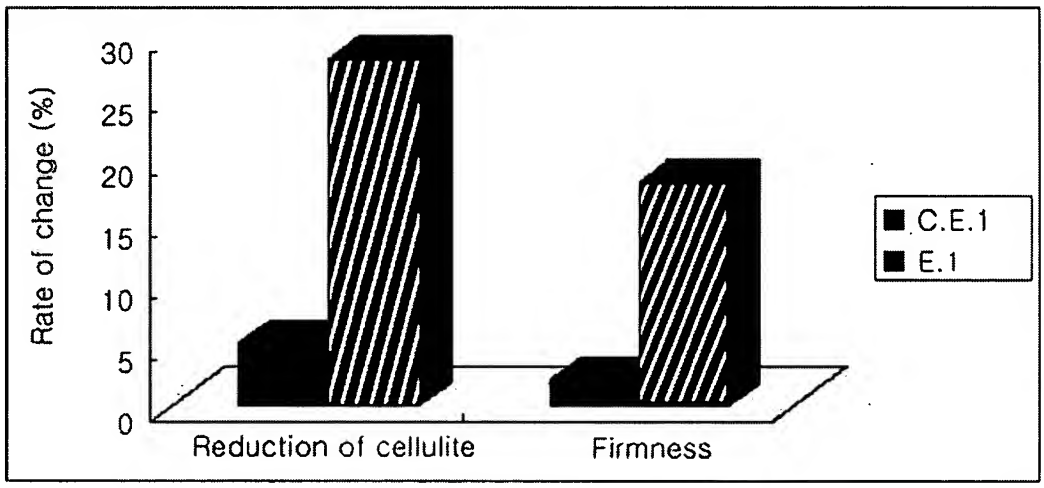
【FIG. 5】


Reduced thigh girth (cm)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Comparative example
Example 1

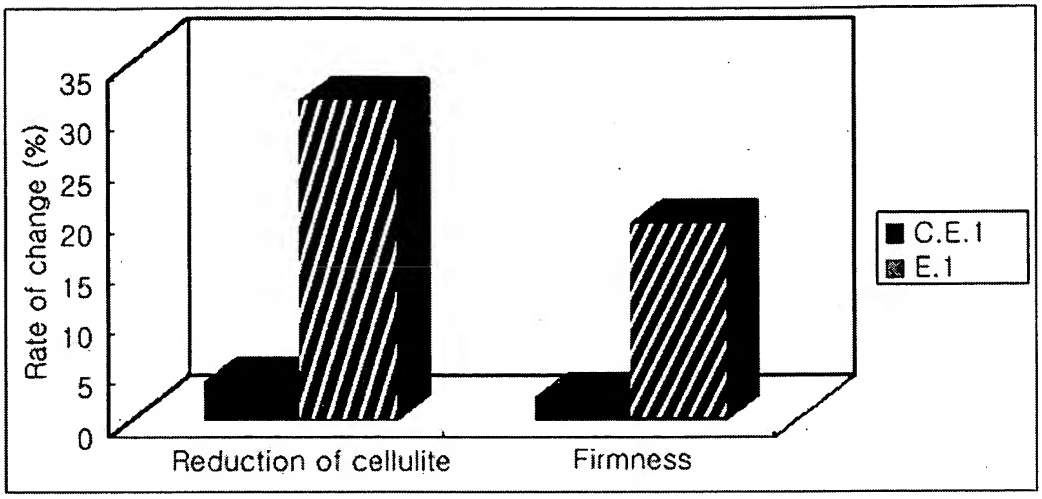
【FIG. 6】


Reduction rate of subcutaneous fat (%)
3.5
3
2.5
2
1.5
1
0.5
0
Comparative example 1
Example 1

【FIG. 7】


Rate of change (%)
30
25
20
15
10
5
0
Reduction of cellulite
Firmness
C.E.1
E.1

【FIG. 8】


35
30
25
20
15
10
5
0
Rate of change (%)
Reduction of cellulite
Firmness
C.E.1
E.1